

MILLET AS A REPLACEMENT FOR CORN IN GROWING/FINISHING SWINE DIETS: EFFECTS ON PERFORMANCE AND NUTRIENT OUTPUT.

Uchewa, E. N and Otuma, M. O

Dept. of Animal Production and Fisheries Mgt. Ebonyi State University, P. M. B. 053, Abakalilki

ABSTRACT

This experiment was conducted with 12 pigs to investigate the effect of diet on performance and nutrient outputs, using millet as replacement for corn in swine diet. Dietary treatments were corn + soybean meal (A), millet + soybean meal (B) and millet + soybean meal + synthetic amino acid (C). Pigs were housed in metabolism stalls designed to allow for total faecal and urine output and were fed twice daily to approximately 90% *ad libitum* intake. Data collected were analyzed using the general linear model procedure of SAS, with $Q = 0.20$ while means were separated using preplanned orthogonal comparison (A vs B and vs C). Results showed that there was no significant difference ($P > 0.20$) in pig performance, but there was a reduction in phosphorus excretion by nearly 29%.

KEYWORD: Pig Millet, Nutrient output, replacement and performance.

INTRODUCTION

It is difficult to read any publication related to animal agriculture or the environment and not see some reference to swine waste. Swine lagoons, spray fields, odor and even feeding/housing systems have become a major topic of concern. Addressing the issues of swine manure management is complicated by the national and international attention. Permanent solutions take time and resources, two items often lacking.

Dietary adjustments to reduce or modify nutrient excretion have the potential to address the issues surrounding swine manure management with minimal time and resources. Cromwell (1996) reported significant reductions in urinary and total nitrogen excretion when synthetic amino acids were used to replace a portion of the soybean meal in growing swine diets. Owsley and Hydon (1989) showed the potential for improving nutrient balance by using wheat or millet with synthetic amino acids in swine diets. Both grains contain more total and available phosphorus than does corn (NRC, 1998; Hale *et al*, 1985). Interest in millet as a swine feed ingredient has increased in the last 5 years millet contains more Lysine and phosphorus than wheat, but the availability of the grain itself limits its use. Meyer *et al*. (1996) reported no difference in performance of pigs fed wheat or millet. If feeding millet will address the issues of nitrogen and or phosphorus excretion while maintaining acceptable pig performance, the opportunities for its production should increase.

This study is therefore made to investigate the effects of dietary manipulations on nutrient output and fertilizer value of manure in growing swine. The purpose of the experiments in this report was to determine the effect of replacing corn with millet on nutrient excretion and pig performance

MATERIALS AND METHODS

This research was conducted in the piggery unit of the department of animal Science, Ebonyi State University. Twelve pigs weighing 40kg were used in a replicated 3x3 Latin Square design to determine the effects of diet on nutrient output. Pigs were housed in stainless steel metabolism stalls designed to allow for total faecal and urine output. Pigs were fed twice daily to approximately 90% of *ad libitum* intake. Faces and urine were collected for three periods. A 3 day acclimation period was followed by 5 days of total feces and urine collection. Samples were frozen as collected and saved for analysis.

Dietary treatments were corn + soybean meal (A), millet + soybean meal (B) and millet + soybean meal + synthetic amino acid (C). Resources seeds provided the millet used throughout the experiment. Experimental diets (table 1) were formulated to contain comparable levels of lysine and available phosphorus, and to meet the daily requirement of each based on 90% of *ad libitum* intake. All other nutrient levels either met or exceed NRC recommendations (NRC, 1998).

Data from the experiment were analyzed using the General Linear Model procedure of SAS, with 0-20. Means were separated using preplanned orthogonal comparisons (A vs B and B vs C)

RESULTS AND DISCUSSION.

Table 2 contains the nitrogen excretion data. Faecal nitrogen excretion was lower and nitrogen higher for pigs fed the corn-based diet. However, replacing millet with corn and adding synthetic amino acids in the diet decreased urinary nitrogen excretion and increased nitrogen retention.

Table 1. Nutrient composition of diets.

Nutrient ²	Dietary treatment ¹		
	A	B	C
Crude protein	16.27	17.77	13.53
Lysine	0.95	0.95	0.95
Calcium	0.60	0.60	0.60
Total phosphorus	0.50	0.45	0.41
Available phosphorus	0.23	0.23	0.23

¹A: Corn + soybean meal; B: millet + soybean; meal; C: millet + soybean meal + synthetic amino acids.

²Valus calculated from chemical analysis of ingredients (available p calculated using availability vales from NRC (1998).

Table 2. Effects of dietary treatment on nitrogen excretion.

Response	Dietary treatment ¹ A	B	C	Pr>F	Contrasts A vs B	B vs C
Faecal excretion, g/d	15.94	18.82	20.51	0.15	*	
Urinary excretion, g/d	13.28	16.45	10.35	0.08	*	*
Total excretion, g/d	29.22	35.26	30.86	0.12	*	*
Retention	41.57	28.53	35.86	0.05	*	*

¹A: Corn + soybean meal; B: millet + soybean; meal; C: millet + soybean meal + synthetic amino acids.

Table 3 contains the phosphorus excretion data replacing millet with corn and adding synthetic amino acids in a soybean-based feed had no effect on phosphorus excretion ($P > 0.02$). Faecal and total phosphorus excretion was greater for the corn-based diet than the millet-based diet. Further analysis of the data using phosphorus intake as a coverable produced the same results. This indicating that the estimates used for phosphorus availability were probably low.

Table 3. Effects dietary treatment on phosphorus excretion.

Response	Dietary treatment ¹			Pr>F	Contrasts A vs B	B vs C
	A	B	C			
Faecal excretion, g/d	1.05	0.74	0.77	0.08	*	
Urinary excretion, g/d	0.03	0.03	0.02			
Total excretion, g/d	1.08	0.77	0.97	0.07	*	

¹A: Corn + soybean meal; B: millet + soybean; meal; C: millet + soybean meal + synthetic amino acids.

There was no difference in growth rate (818 vs 841 g/d) or conversion (gain/feed) 288 vs 309 g/kg for pigs fed diets A or B, respectively ($P > 0.02$) for any period or for the 98 day trial.

Upon completion of all collections, frozen samples were thawed, homogenized and analyzed for nitrogen, phosphorus, zinc and copper. A micro-Kjeldahl procedure was used to determine nitrogen levels (AOAC, 1990). Mineral levels were analyzed using ICAP (AAES, 1986).

CONCLUSIONS

Base on the data from this experiment, corn with millet in grow/finish diets had no effect on pig performance, but did reduce phosphorus excretion by nearly 29%. Additional work is needed to see if this effect is due to higher phytase levels in millet, or if other factors may be affecting availability. The effects of synthetic amino acid supplement of millet, while not reported here, have been shown by others to support performance comparable to millet-soybean meal (Meyer *et al*, 1996).

REFERENCE

- AAES, 1986. Procedures used for soil and plant analyses by the auburn university soil testing laboratory. January 1986. Department of Agronomy and Soils Department Series No. 106, Alabama.
- AOAC, 1990, Protein (Crude) determination in animal feed: Copper Catalyst kjeldahl method. (1984.13) official methods of analysis. 1990. Association of Official Analytical Chemists. 15th edition.
- Cromwell, G. L. 1996, synthetic amino acid may improve performance, reduce nitrogen excretion. *Feedstuffs* v. 68: 12-13,17-19,31.
- Hale, O. M., D.D. Morey and R.O. Meyer, 1985. Nutritive value of Beagle 82 millet for swine. *Journal of Animal Science* 60:503.
- Meyer, R.O., J.H. Brendemuhl, and R.D. Barnett, 1996. Crystalline lysine and threonine supplement of soft winter wheat or millet, low-protein diets for growing-finishing swine. *Journal of Animal Science* 74:577.
- NRC, 1998, Nutrient requirements of swine 10th revised edition. National Research Council. National Academy Press.
- Owsley, W. F. and K.D. Hydon. 1989. Amino acid supplementation of small grains in swine diets. *Proc. Of the Georgia Nutrition Conference*:

Received for Publication: 03/07/2008

Accepted for Publication: 24/07/2008

Corresponding Author:

Uchewa, E. N

Dept. of Animal Production and Fisheries Mgt. Ebonyi State University, P. M. B. 053, Abakalilki